P2-H14

# Variation of Ambient $PM_{2.5}$ Exposure and Thyrotropin Abnormality in 1.2 Million Chinese Reproductive-aged Women: a National Retrospective Cohort Study

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1. Exposure to increased **variation in ambient $PM_{2.5}$** is associated with increased risk of **thyrotropin abnormalities** in reproductive-aged women.

2. Our study call for further research on the relationship between variation of ambient air pollution and **metabolic response** in humans.

## BACKGROUND

The effect of ambient $PM_{2.5}$ exposure on human thyroid function has been extensively studied, but the variability of $PM_{2.5}$ exposure on thyrotropin has not been explored before.

## METHODS

We conducted a population-based retrospective cohort study based on 1 223 596 Chinese reproductive-aged women who participated in the National Free Preconception Checkup Project twice during 2010-2019. The main exposure was coefficient variation (CV) of annual $PM_{2.5}$ exposure. And the main outcome was thyrotropin abnormality, including subnormal (<0.37 mIU/L) and supranormal (≥4.88 mIU/L) thyrotropin. We used inverse probability weighted logistics regression model to adjust the imbalance caused by covariates and estimate ORs and their corresponding 95% CI. And restricted cubic splines were used to present the non-linear relationship between exposure and outcome.

## RESULTS

Among participants with normal thyrotropin at the first visit, the corresponding inverse probability-weighted ORs of subnormal thyrotropin were 1.26 (95% CI: 1.09-1.47), 1.29 (1.11-1.49), and 1.08 (0.92-1.26) for participants exposed to Q2, Q3, and Q4 level of CV-$PM_{2.5}$ in comparison to participants with Q1 exposure of CV-$PM_{2.5}$; and the corresponding ORs for supranormal thyrotropin were 0.89 (0.84-0.95), 0.95 (0.90-1.01), and 1.17 (1.11-1.24). And the non-linear relationship were presented in Figure 1. And among participants with subnormal thyrotropin at the first visit, the corresponding ORs for subnormal thyrotropin at the second visit were 1.13 (0.99-1.30), 1.58 (1.39-1.81), and 1.59 (1.40-1.80) for participants exposed to Q2, Q3, and Q4 level of CV-$PM_{2.5}$; and the corresponding ORs of supranormal thyrotropin were 1.17 (1.08-1.27), 1.21 (1.13-1.32), and 1.21 (1.11-1.32).

## RESULTS CONTINUED

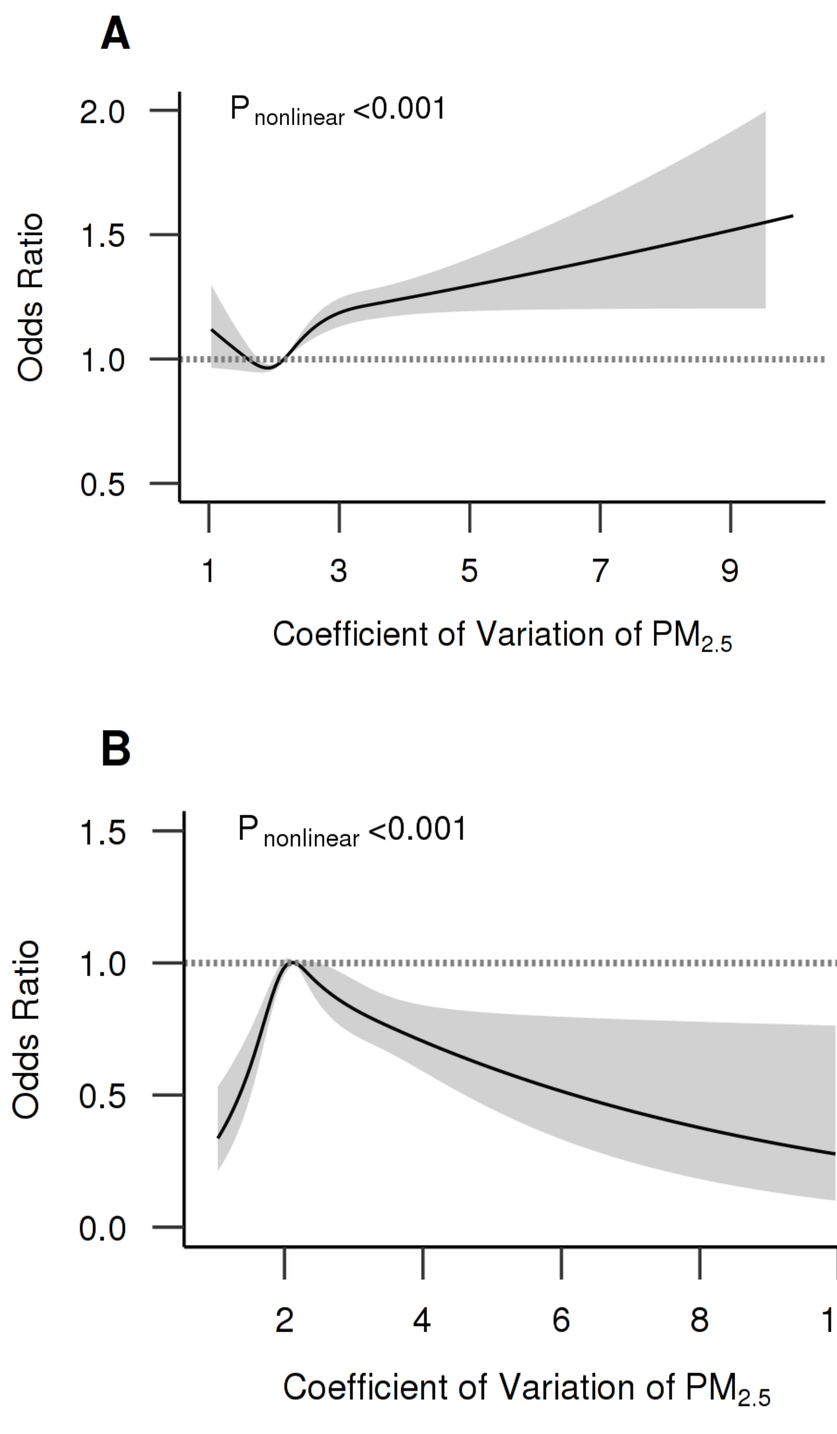


**Figure 1**. Expose-response relationship between variation of long-term exposure to $PM_{2.5}$ and the risk of thyrotropin abnormality among participants with normal thyrotropin levels at the first visit.
**Legend: A.** Subnormal TSH; **B.** Supranormal TSH.

## CONCLUSIONS

The variation of ambient $PM_{2.5}$ exposure was associated with increased risk of thyrotropin abnormality.

## ADDITIONAL KEY INFORMATION

The authors thank health workers and countless participants throughout 31 provinces in the NFPCP for their great efforts and collaboration.

WCE
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